

From Real to Synthetic Data

*Unlocking Industrial AI
by avoiding
the Black Box Trap*



Syamak Nazary
Director Business Development



Markus Förste
CTO

Who is who ?



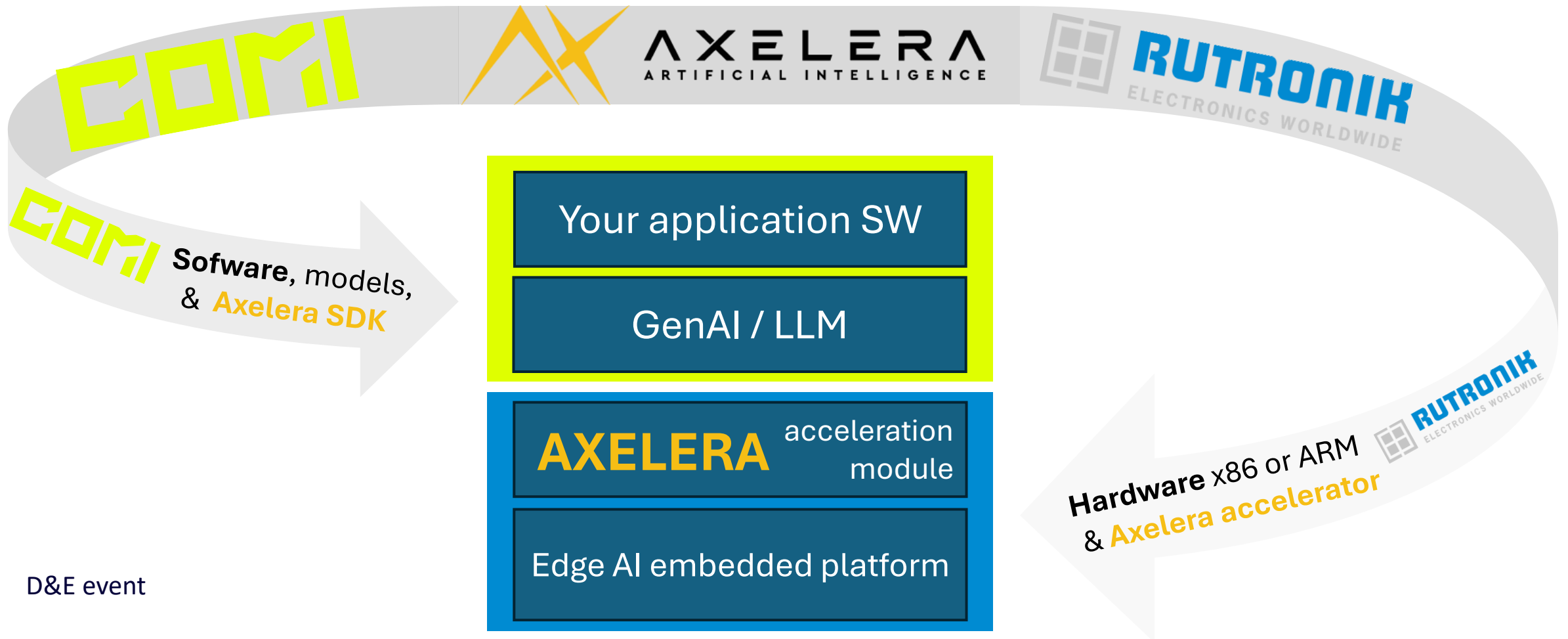
Markus Förste
Head of AI



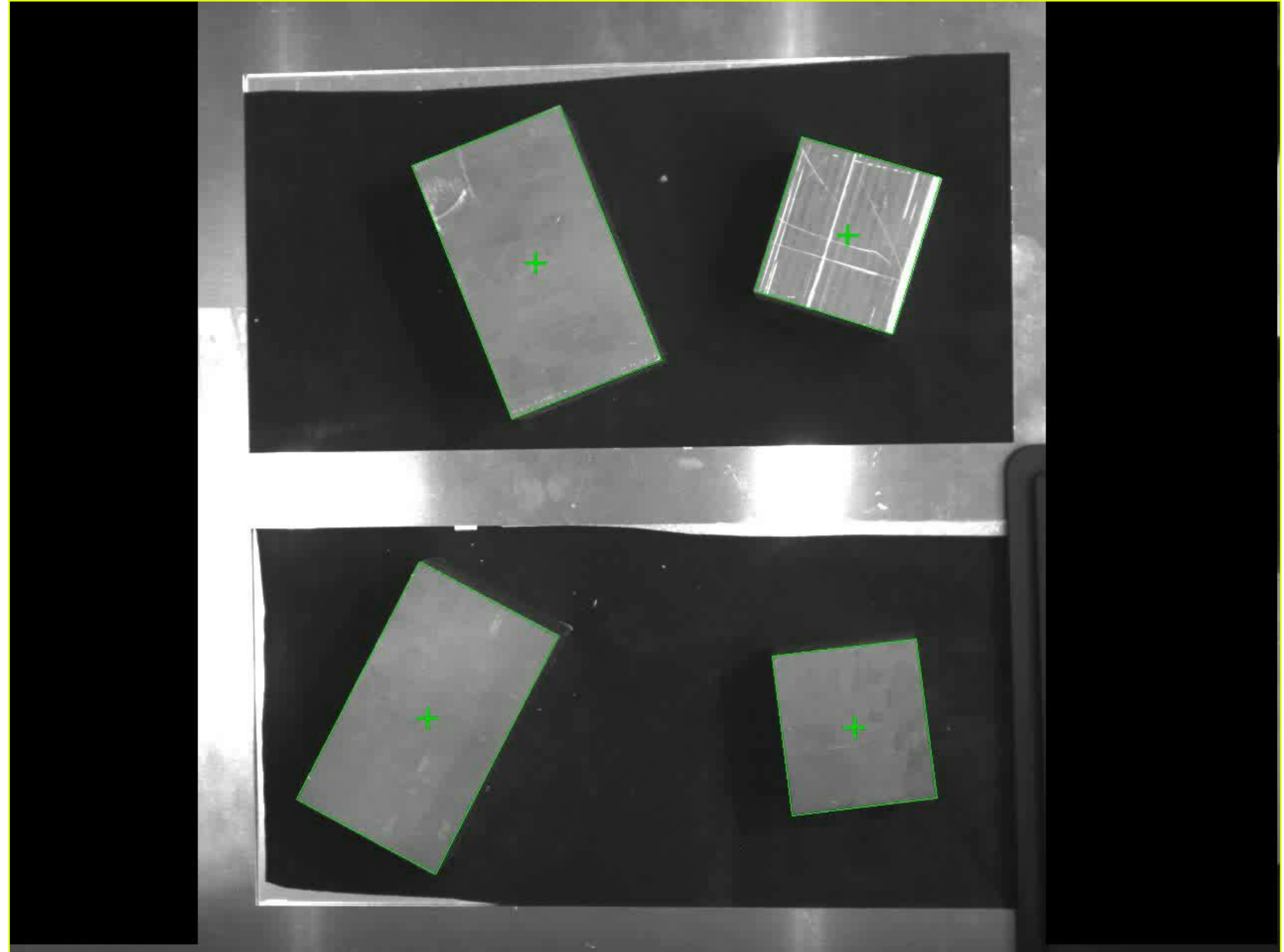
Syamak Nazary
Director Business Development



Patrick Pullens
BDM Embedded & AI

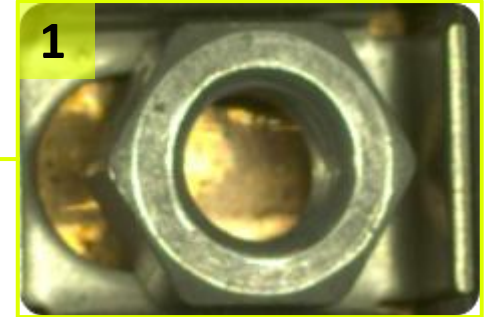
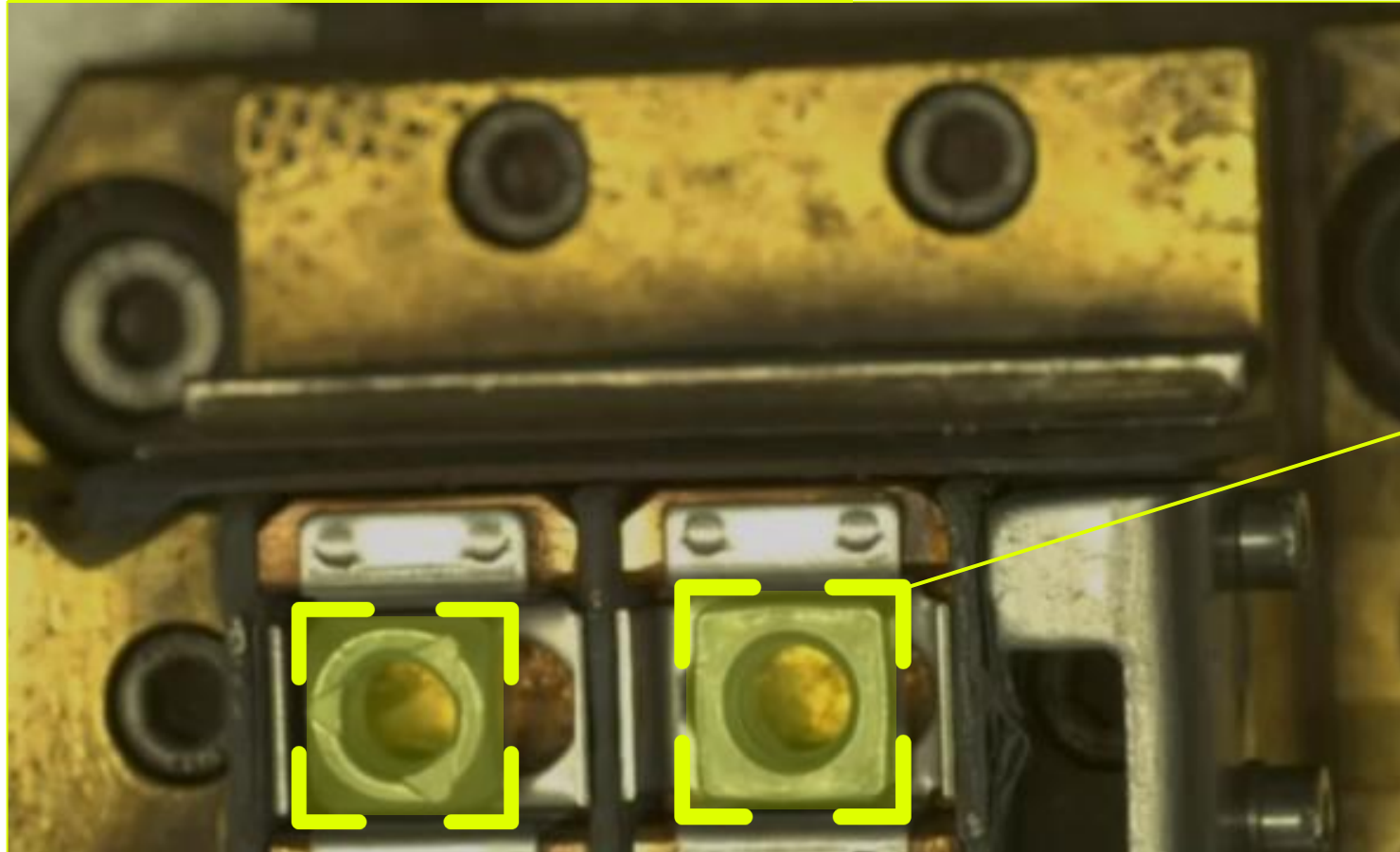


Why AI?



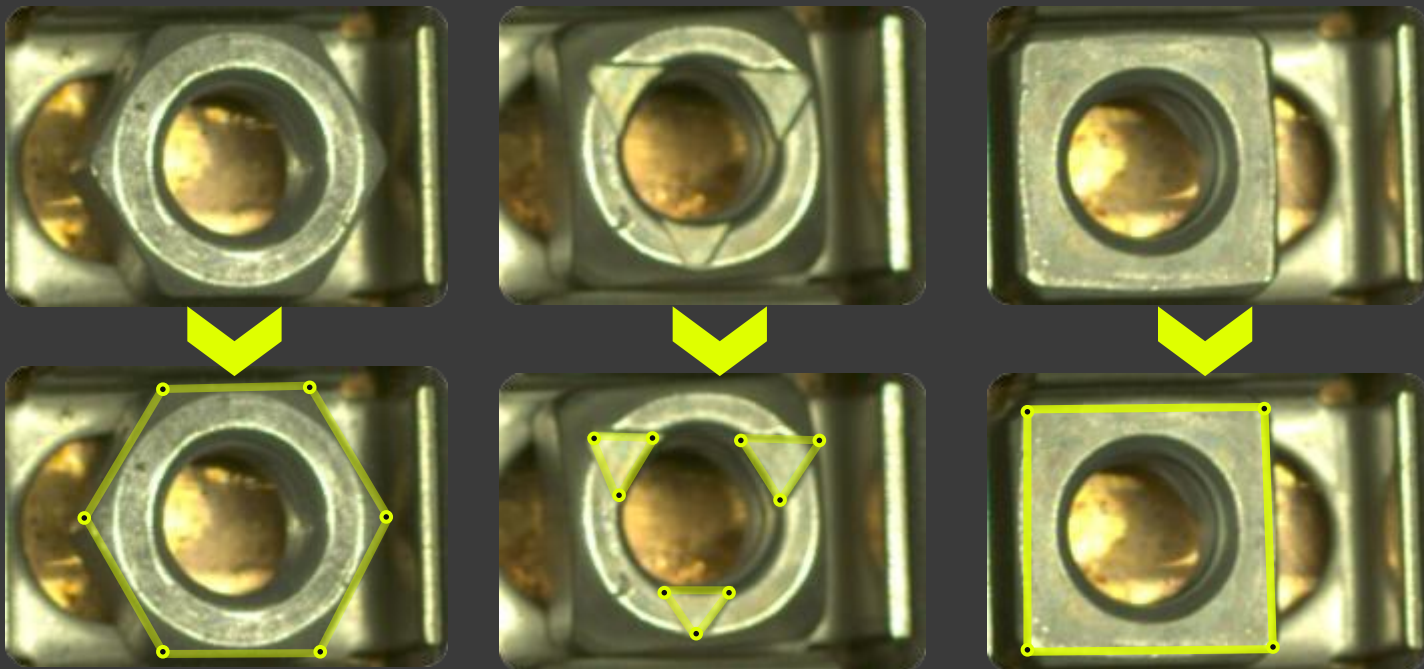
Example from Production

Classification / Checking in Manual Process



Classic Image Processing

Manual Process
Template Matching + Edge Detection



Limitations

Change of Lighting / Hardware

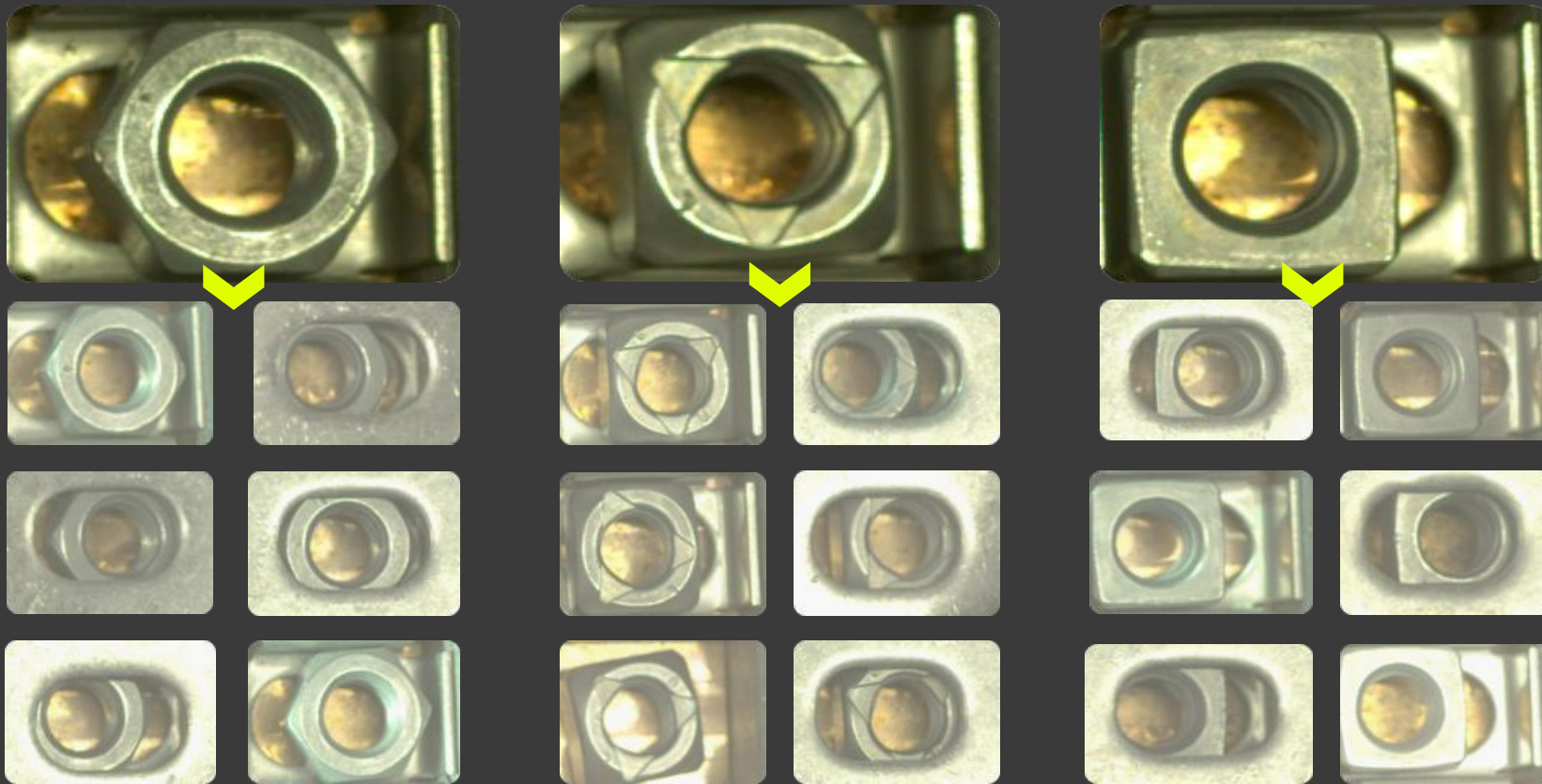


Dirt / Changes of Object



Classifications with AI – Model Training

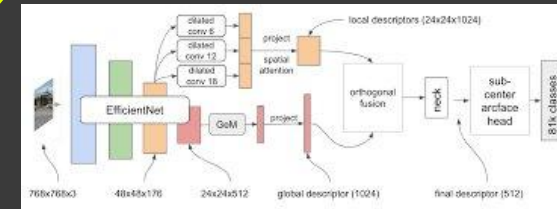
1. Gather Training Data



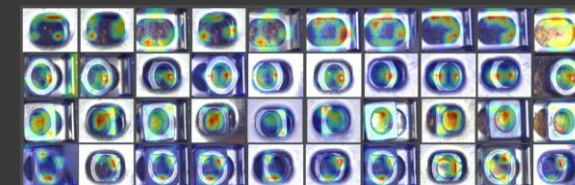
Training Data

D&E event

2. Train Model



3. Evaluate Model



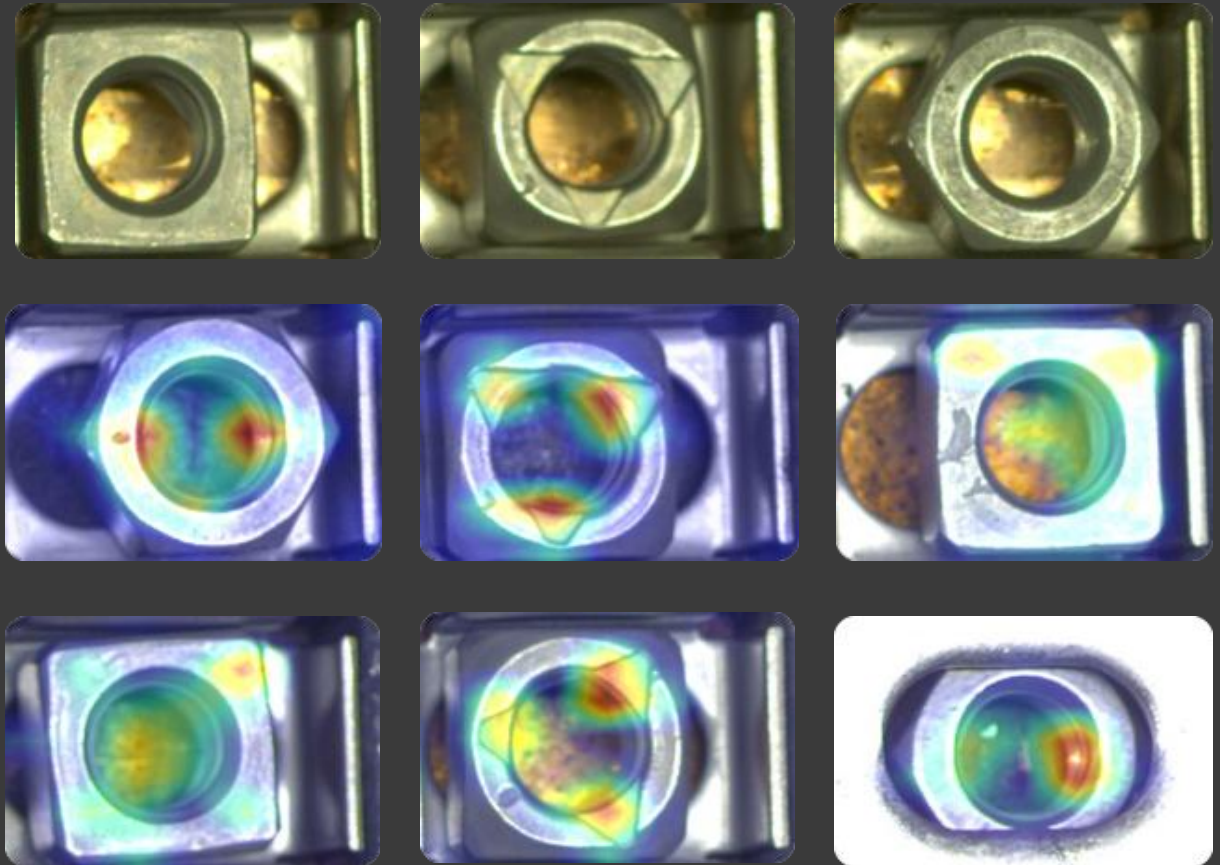
4. Deploy Model

Classification with AI - Explainability

Is AI a **BLACKBOX**?

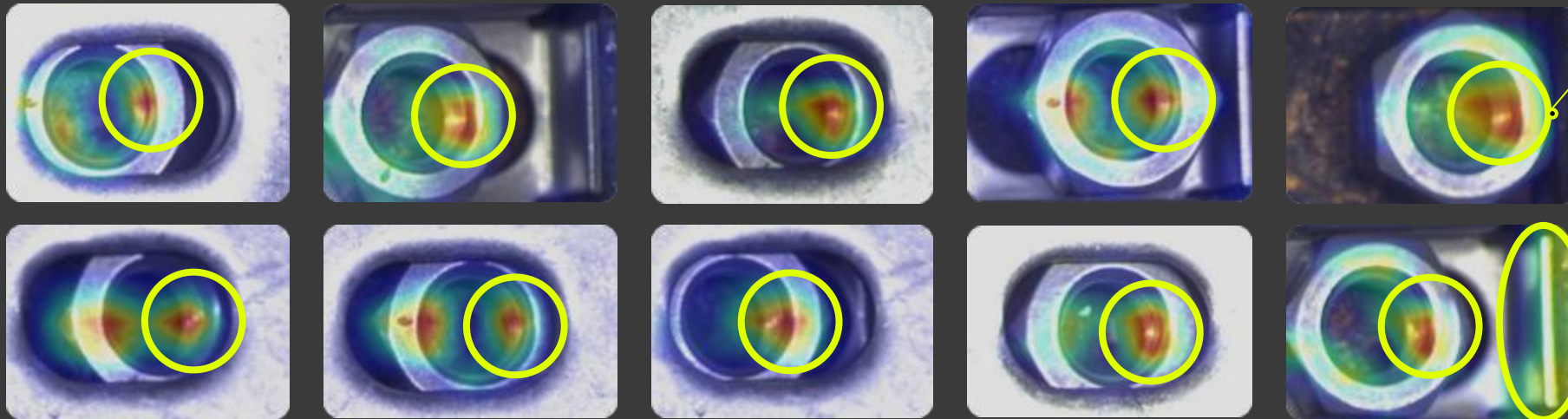


Explainable AI – Grad CAM



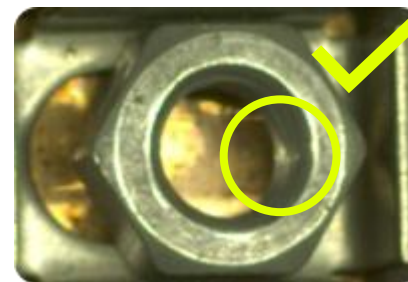
Classification with AI – Training Data

Explainable AI – Grad CAM



Specular reflexion in
thread

Reflexion of nut in
metal casing



Challenges of AI in Production

Data



Not enough
training data



Objects not
available



Unclear camera
setup



Difficult or
Changing conditions



Dirt / Dust /
Liquids

Experience



Certification of AI
based solutions

Connection to Customer



Identifying
problems



Bridging gap
between AI and
domain experts

Hardware



Getting sufficient
hardware



Performance /
Reliability /
Precision

Scaling

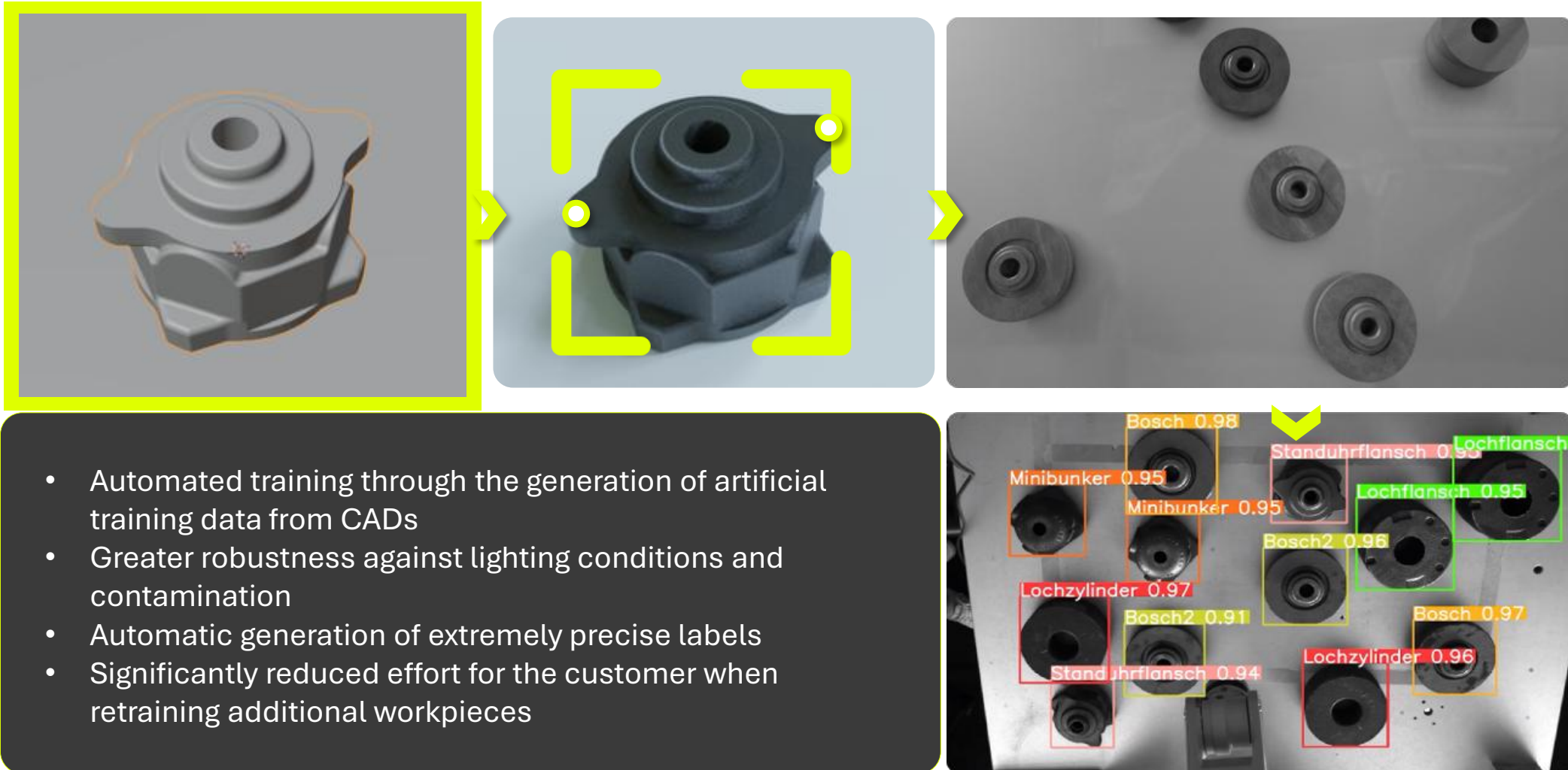


Enabling
customer to
train model



Scaling
solutions

Synthetic Data

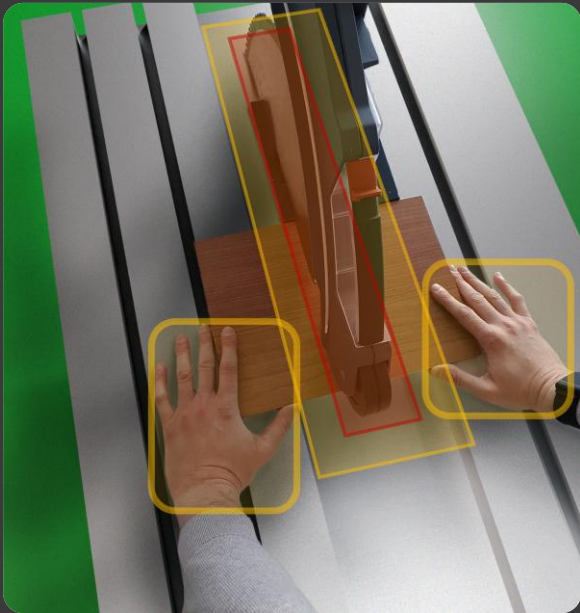


Types of AI – Getting the fitting hardware

Vision Systems

For example:

- 3M Parameters
- RAM usage 1-2 GB



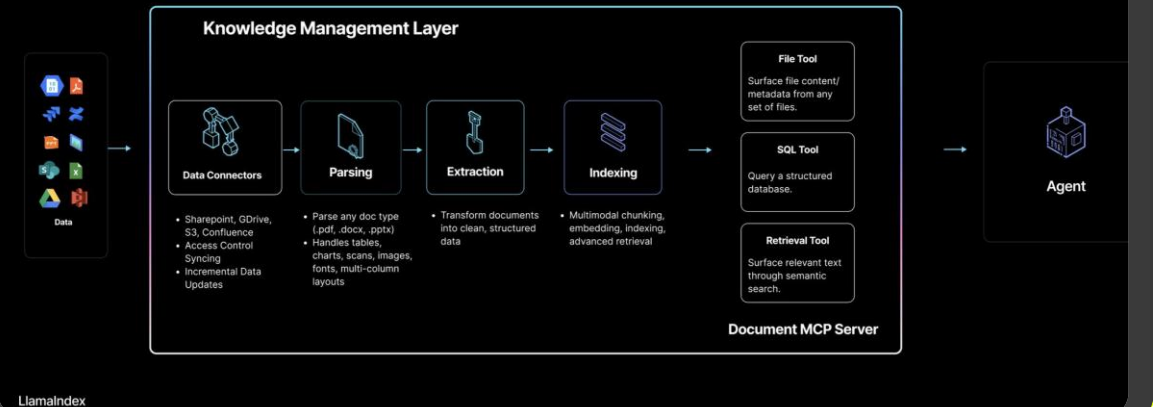
GenAI / LLMs



1. Document MCP Layer for Agents

Document agents need a layer to process and structure documents into highly accurate data.

They then need the right tool interfaces over that data (not just naive vector search!)



System setup examples

High End / High speed / Full function AI platform / Multiple acceleration models use case

Main motherboard (supplied by Rutronik)

- Axelera Metis on **PCIe** interface card (supplied by Rutronik)
- Axelera SW tooling
- LLM software support from COMI



High Speed / Compact embedded Edge AI system / 'off the shelf' for Time To Market

Single Board Computer or BoxPC (supplied by Rutronik)

- Axelera Metis on **M.2** module (supplied by Rutronik)
- Axelera SW tooling
- LLM software support COMI



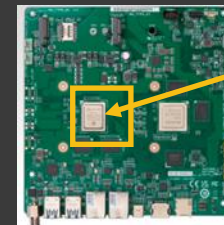
+



Dedicated chipdown / very compact / low power / cost down — for high volume only

Dedicated ARM core design (chip down) guided by Rutronik

- Axelera Metis **chip**
- Axelera SW tooling
- LLM software support COMI



Accelerator
chip

COMI Vision AI Reader

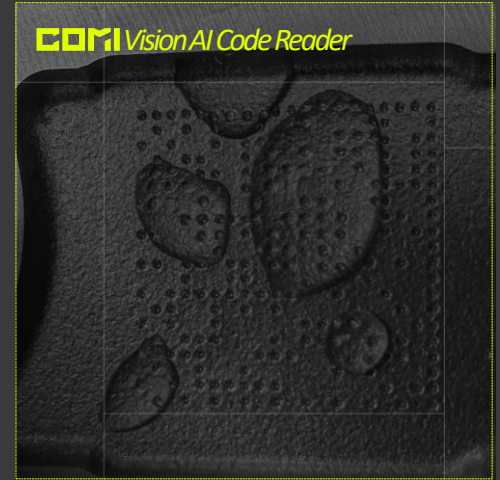
Complete and intelligent recognition of documents, labels, and codes.

| Item Name/Description | Qty | |
|---|--------|---------|
| COMI Vision AI Document Reader | | |
| Metal Film Resistor 0204 1% 50ppm 1/4W 2.15K | 9.000 | KPS €5 |
| Metal Film Resistor 0204 1% 50ppm 1/4W 2.15K | 12.000 | KPS €5 |
| Metal Film Resistor 0207 1% 50PPM 1W 1M | 50.000 | KPS €14 |
| | 171 | |
| | 2CTNS | |
| Total Amount: DRED AND SEVENTY FIVE AND CENTS FOURTEEN ONLY. | | |

COMI Vision AI Label Reader

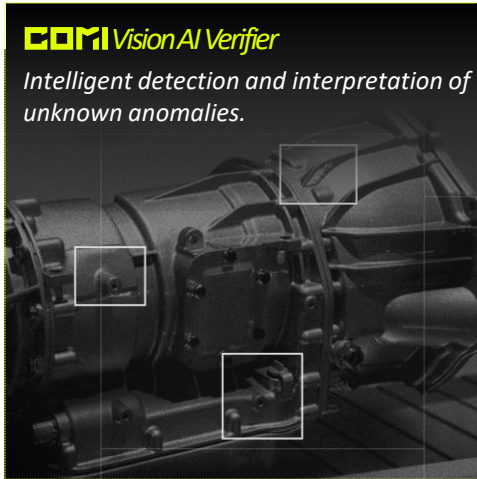


COMI Vision AI Code Reader



COMI Vision AI Verifier

Intelligent detection and interpretation of unknown anomalies.



COMI Vision AI SafetyGuard

Maximum safety through contactless detection of dangerous hand movements.



COMI Vision AI Object Localization

Precise object detection and positioning using AI-controlled robotic grippers.



COMI Gen AI Agent

Intelligent chatbots and data-driven insights for a better customer experience.



The screenshot displays the COMI Vision AI Reader interface. At the top right, the logo 'COMI' is accompanied by the tagline 'We enable AI in a smart way' and the product name 'Vision AI Reader'. The main area is a camera feed showing a circular object with two labels highlighted by yellow bounding boxes. The interface is divided into several sections:

- Top Left:** Status indicators: 'Artikel nicht in Bewegung', 'Alle Label sichtbar', and 'Alles gefunden'.
- Table:** A table with two columns: 'Detect Type' and 'Content'.

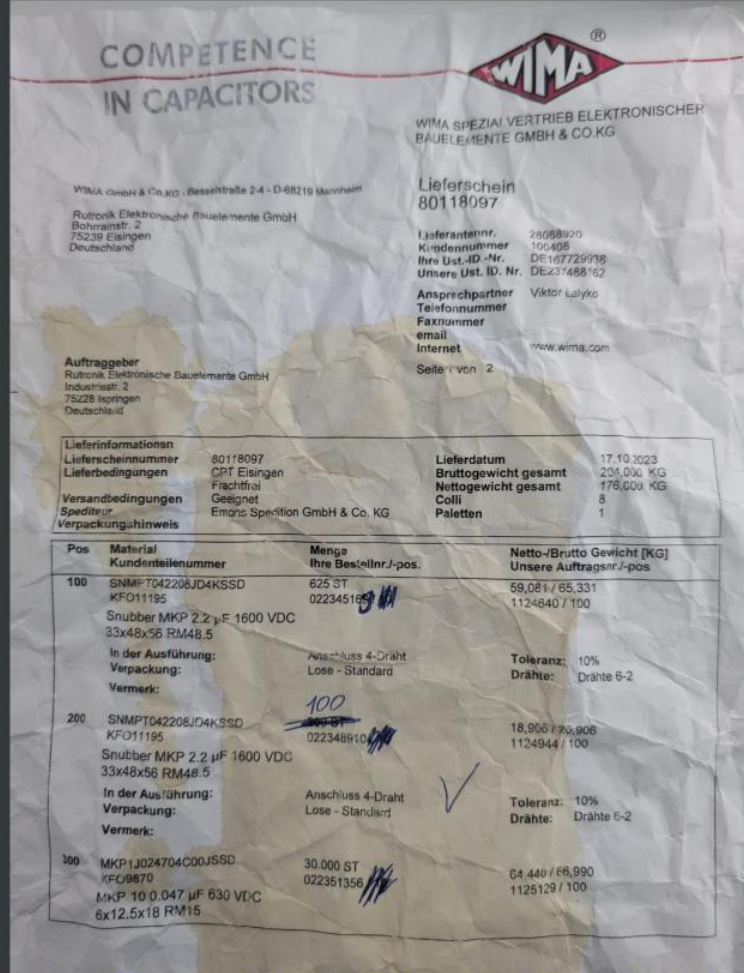
| Detect Type | Content |
|-------------|-----------------|
| 1D Barcode | PWSR2275 |
| 1D Barcode | 1T234810262H |
| 1D Barcode | 4LPHL |
| 1D Barcode | 1PESR03EZPF1003 |
| 1D Barcode | 9D2348 |
- Bottom Left:** 'Aktuelles Label' section with a list of fields: 'Nr Artikel-Nr' (ESR03EZPF1003), 'Date-Code' (2348), 'Lot-Code' (234810262H), 'Menge' (531), and 'Ursprungsland' (PHL). Each field has a yellow dot indicator.
- Bottom Middle:** 'Aktuelle Ladungsträgereinheit' section with a form for 'Artikel-Nr.' (ESR03EZPF1003), 'Date-Code' (2348), 'Lot-Code' (234810262H), and 'Ursprungsland' (PHL).
- Bottom Right:** A table for 'Aktuelle Ladungsträgereinheit' with columns: 'UID' (DJPMFWELYMOQYMR), 'Zeitstempel' (1979-01-01T06:26:40.567801), and 'Menge' (531). A 'Zurücksetzen' button is also present.

On the right side of the interface, there are three yellow circular icons: a stylized 'V' with a checkmark, a camera lens, and a smartphone.

Lieferant

WIMA

Feldbezeichnungen ändern
Verwerfen
Absenden



✓
Bilddaten empfangen

✓
Texte erkennen

✓
Lieferanten lesen

✓
Lieferschein untersuchen

Lieferscheinnummer

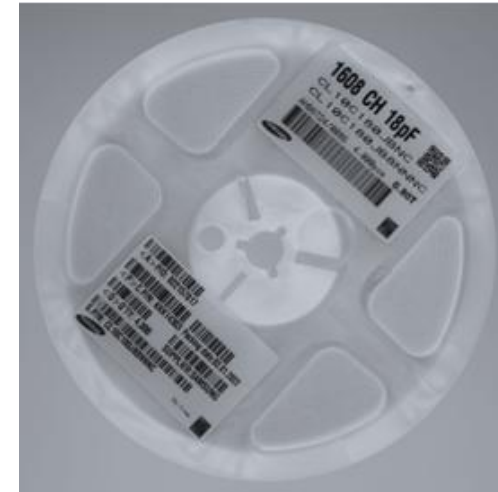
Positionen für Seite 1

↑
1
↓

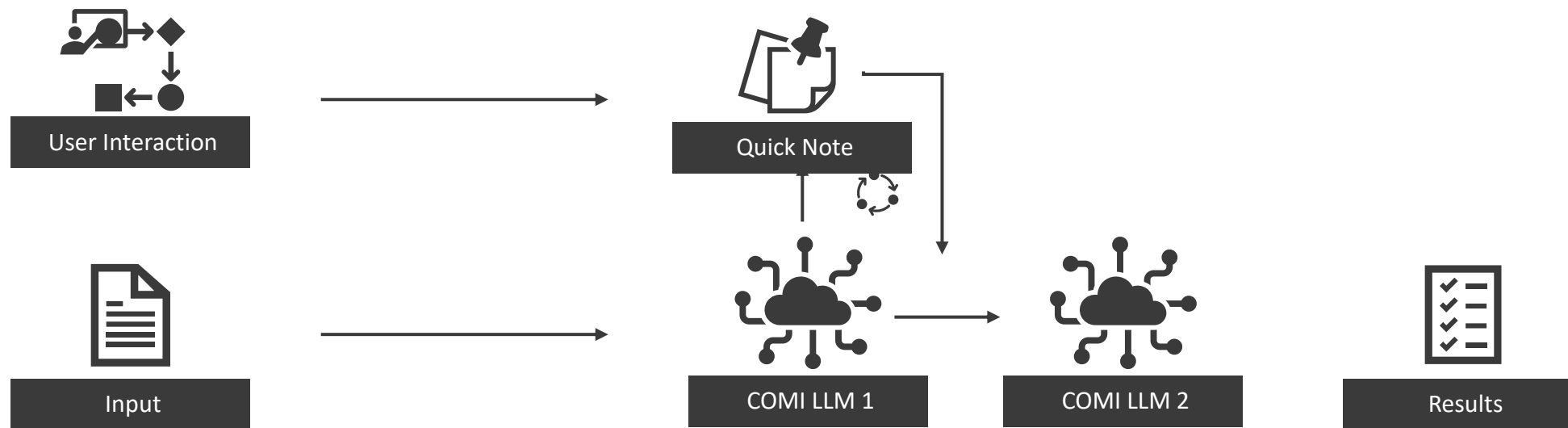
| Status | Bestellnummer | Lieferanten-Artikelnummer | Rutronik-Artikelnummer | Menge | Mengeneinheit | |
|--------|---------------|---------------------------|------------------------|--------|---------------|----|
| ✓ | 022345169 | SNMPT042 | KFO11195 | 625 | ST | 🗑️ |
| ✓ | 022348910 | SNMPT042 | KFO11195 | 200 | ST | 🗑️ |
| ✓ | 022351356 | MKP1J0247 | KFO9870 | 30.000 | ST | 🗑️ |

+ Position hinzufügen

3 Positionen auf 1 Seite

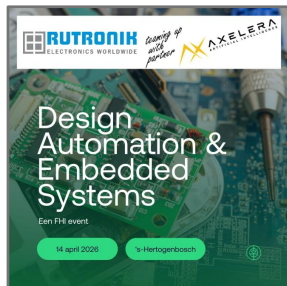
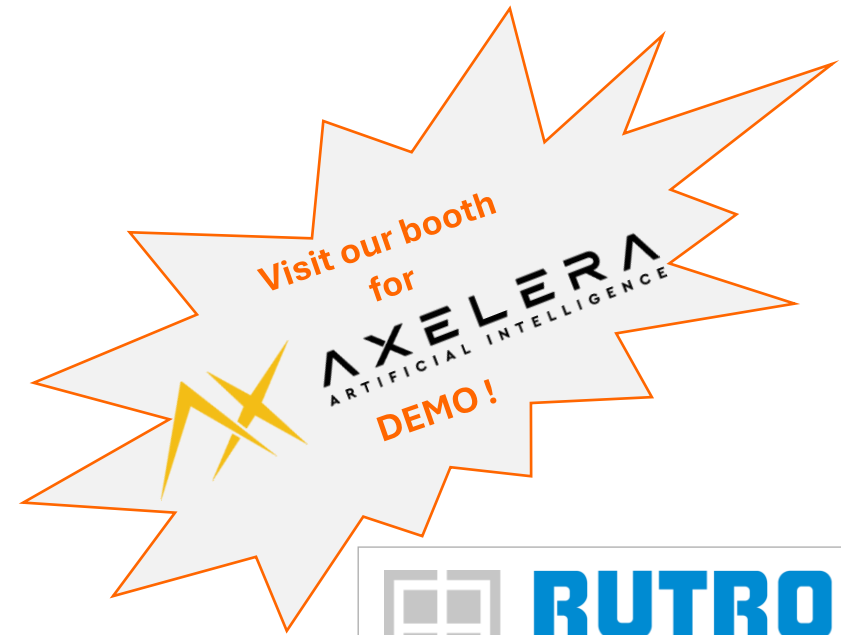


- Training through the generation of artificial data based on different real data input
- Greater robustness against lighting conditions, label varieties and damaged codes
- No retraining in end customer application necessary
- Just IPC hardware like Nvidia Jetson necessary



- Use of multiple LLMs for robustness against diverse layouts, languages and different conditions
- Continues learning through Quick Notes during user interaction

Questions ?



D&E event



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